Prunedale Improvement Project

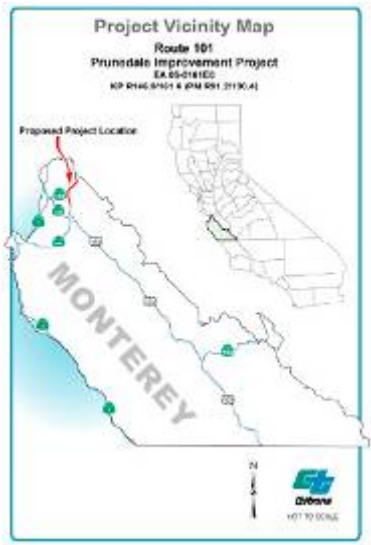
EA 05-0161E1

EROSION CONTROL STRATEGY OVERVIEW

Presented by: Scott Dowlan

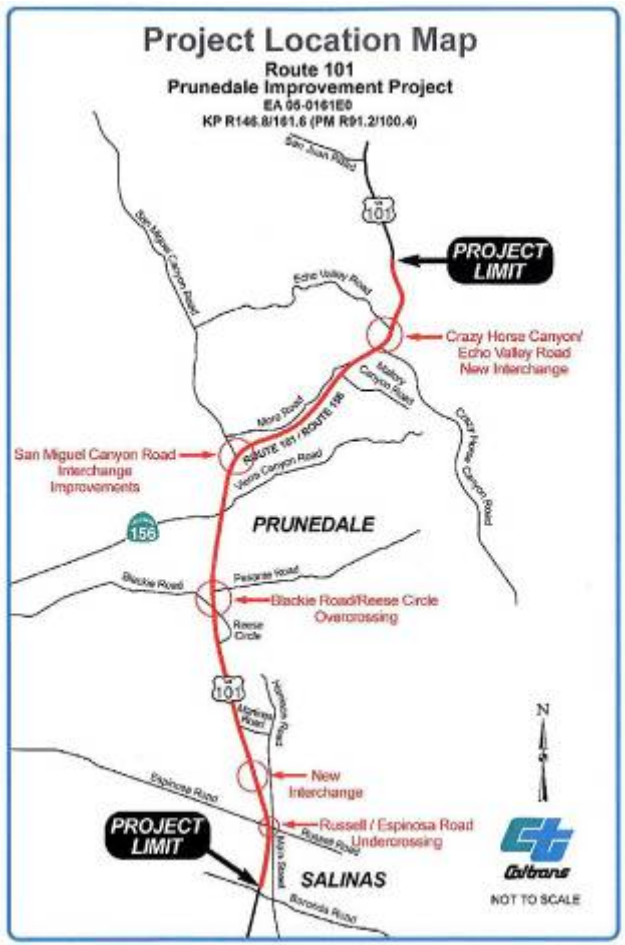
Caltrans

PROJECT LOCATION & SCOPE



LOCATION

- Highway 101 in, Prunedale, Monterey County



SCOPE

- Eliminate at grade intersections.
- Construct two interchanges, one undercrossing, one overcrossing and widen an existing overcrossing.
- 109 acres disturbed soil area.
- 3 – 100 ft. cut slopes
- Cut/Fill slopes typically 2:1 due to R/W and biological constraints.

PROJECT LOCATION & SCOPE

RUSSELL/ESPINOSA UNDERCROSSING

PROJECT LOCATION & SCOPE

SOUTHERN INTERCHANGE

PROJECT LOCATION & SCOPE

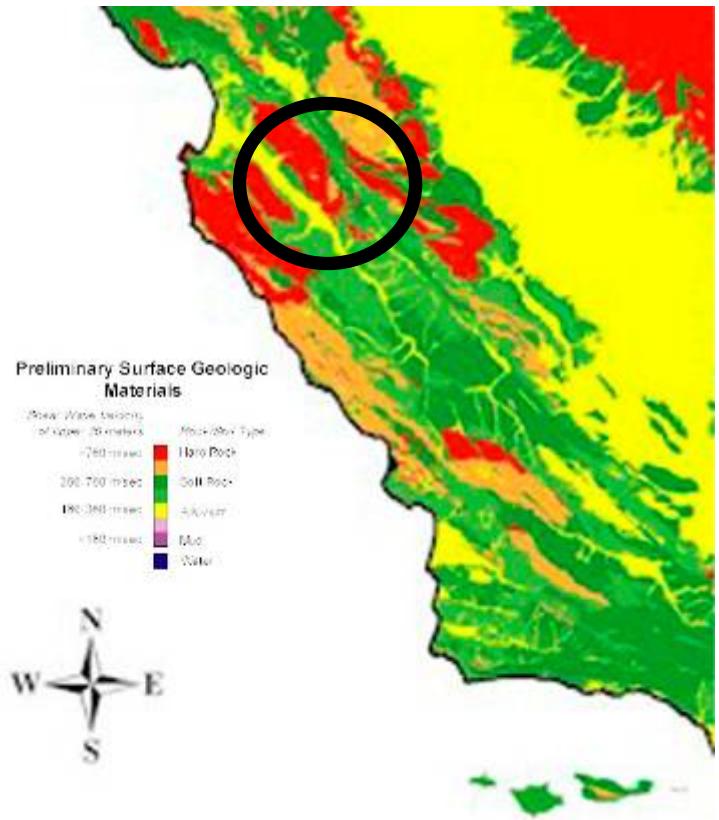
BLACKIE/REESE OVERCROSSING

PROJECT LOCATION & SCOPE

CRAZY HORSE/ECHO VALLEY INTERCHANGE

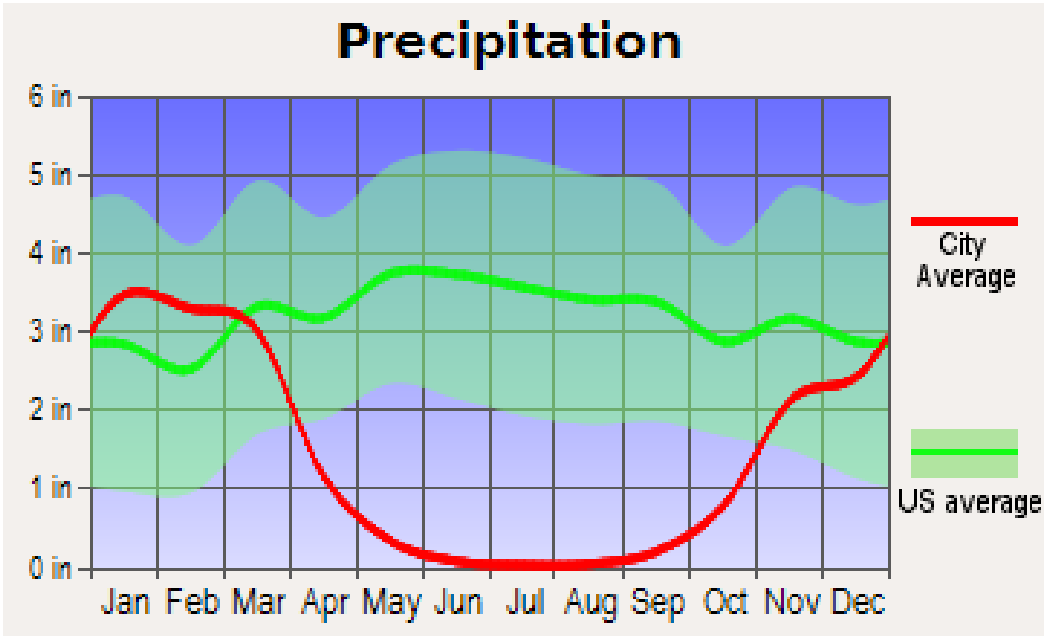
RESEARCH

- SOIL TYPE & CHARACTERISTICS
  - AROMAS SANDS FORMATION
    - EASILY ERODIBLE SANDS, GRAVEL & CLAYS



RESEARCH

- CLIMATE / RAINFALL
  - MILD & SEMI ARID
  - AVERAGE ANNUAL RAINFALL = 18”



CASE STUDY
San Miguel Canyon Interchange

- Located in Prunedale, CA, Monterey County.
- Began Construction June 2000
- Completed Construction February 2003
- Slopes at 2:1 and up to 100 ft. vertical
- Disturbed Soil Area = 13 acres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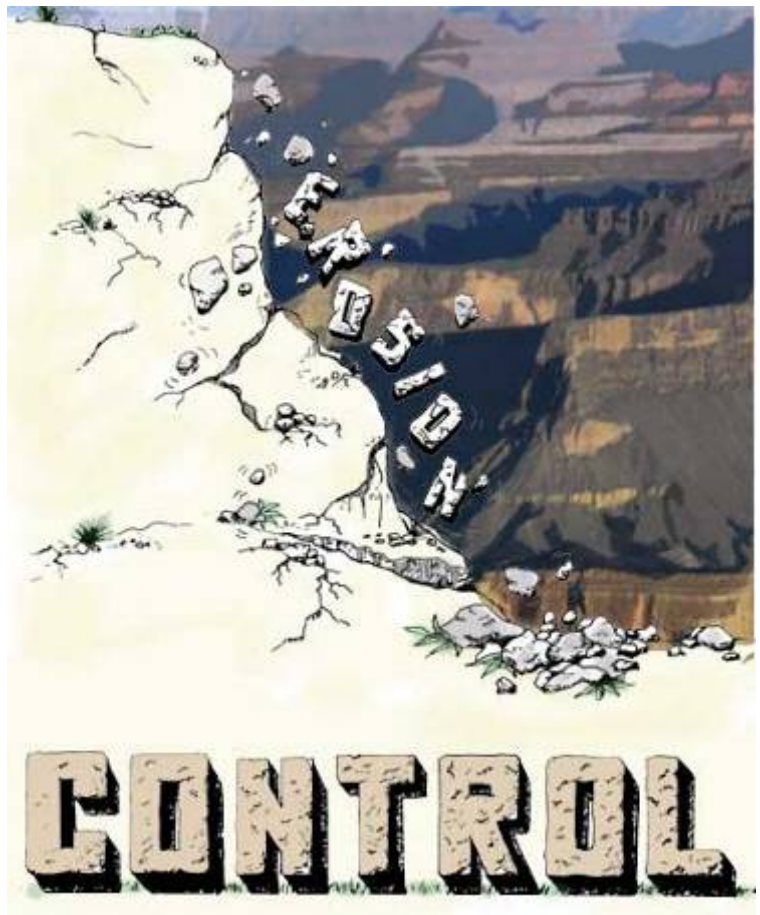
PAVEX CONSTRUCTION DIVISION

LESSONS LEARNED

- Multiple EC strategies implemented.
- Aggressive EC techniques applied.
- Vegetation establishment prior to the first heavy rain event.

PIP EROSION CONTROL STRATEGY

- Comprehensive approach using a combination of erosion control techniques. *No one technique is the silver bullet.*
- Formulate a criteria for where each technique is to be applied based on slope length and steepness.
- Many resources and studies are available documenting various erosion control techniques.



100 ft. CUT SLOPE STRATEGY

- Implement contour grading where feasible
- Construct benches every 30 ft. vertically
- Construct top of cut ditch
- Implement slope roughening
- Apply 2 inch thick compost/duff blend blanket
- Install coir netting
- Install fiber rolls
- Hydroseed with native grasses and fiber
- Install native grass sod strips
- Install plug planting
- Install temporary on-grade irrigation system.
- Multiple Move-in/Move-outs to apply erosion control materials in 30 ft. vertical increments.

CONTOUR GRADING

- Reduces the surface area of the cut slope that is 2:1. *(PIP = 30% - 40%)*
- May result in more disturbed soil area. Evaluate environmental impacts.

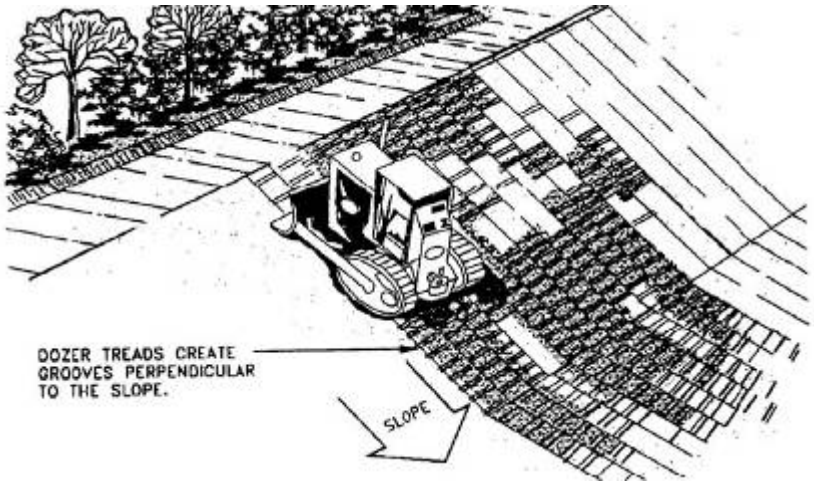
BENCHING

•Reduces slope length. *(Implement where contour grading is not feasible due to environmental impacts)*

TOP OF CUT DITCHES & AC DIKES

•Intercepts surface runoff and minimizes areas of concentrated flows. *(Coordinate with Project Engineer and Hydraulics).*

SLOPE ROUGHENING



•Slows water velocity, increases water infiltration and provides increased opportunity for re-vegetation.

TRACKWALK

•Fill Slopes

SERRATING CUTS

•Cut Slopes

DUFF/CHIPPED MATERIAL

- Mycorrihizal helps to regenerate soil and establish native vegetation.
- Promotes plant establishment by utilizing the existing native seed bank.
- Suppresses exotic weeds.
- Promotes re-use of on-site materials and minimizes hauling costs.

COMPOST/DUFF BLEND BLANKET

•Immediate erosion protection offering high water retention capacity, soil regeneration and vegetation establishment nutrients for permanent stabilization.

NETTING

•Immediate erosion protection and vegetation establishment assistance for permanent stabilization.

FIBER ROLLS

•Breaks slope length and reduces water velocity.

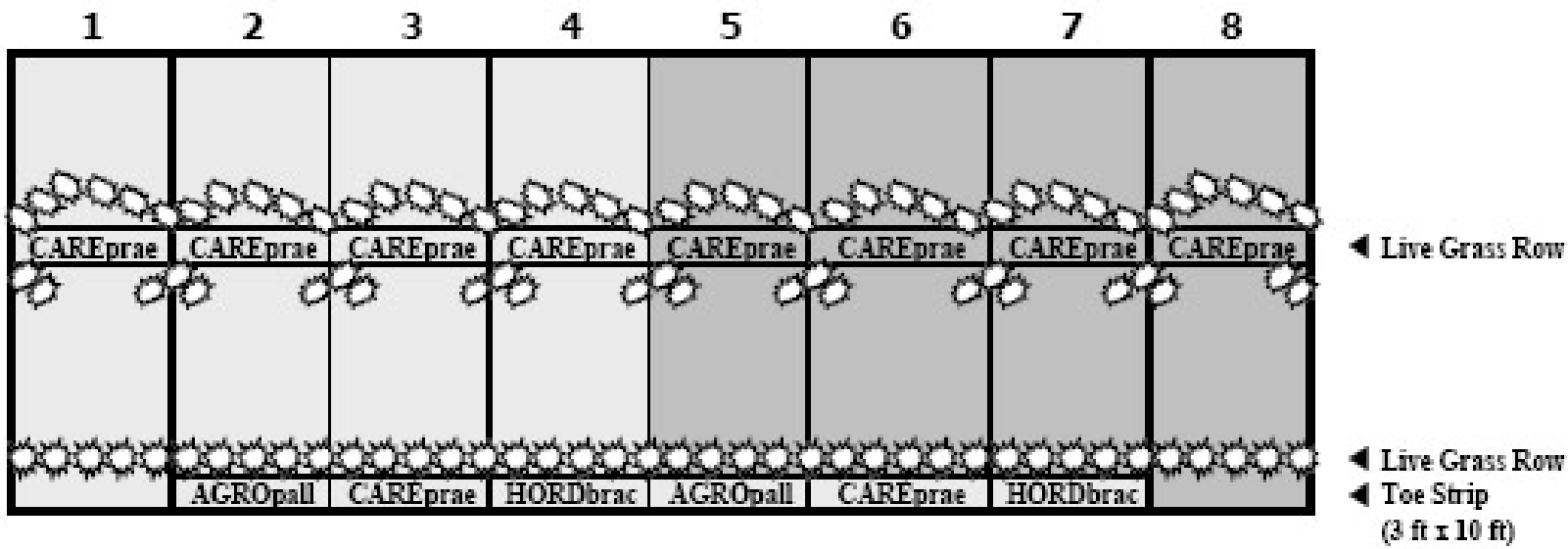
TYPE D (HYDROSEED)

•Temporarily protects exposed soils until seeds germinate *(Minimal protection offered by itself).*

NATIVE GRASS SOD STRIPS

- Shown to be effective in stabilizing erosion prone slopes by establishing grasses, reducing water velocity and filtering sediment.
- Sod strips to be pre-grown 3ft x 10ft. *(Confirm availability).*
- Strip to be placed parallel to the slope contours at mid and toe of slopes. Provide supplemental irrigation.

PLUG PLANTING



- Plug planting is proposed in conjunction with the sod strips.
- Plug planting to form a continuous row above the sod strip and located in clusters of three on the downhill side of the sod strip at the mid-slope locations.

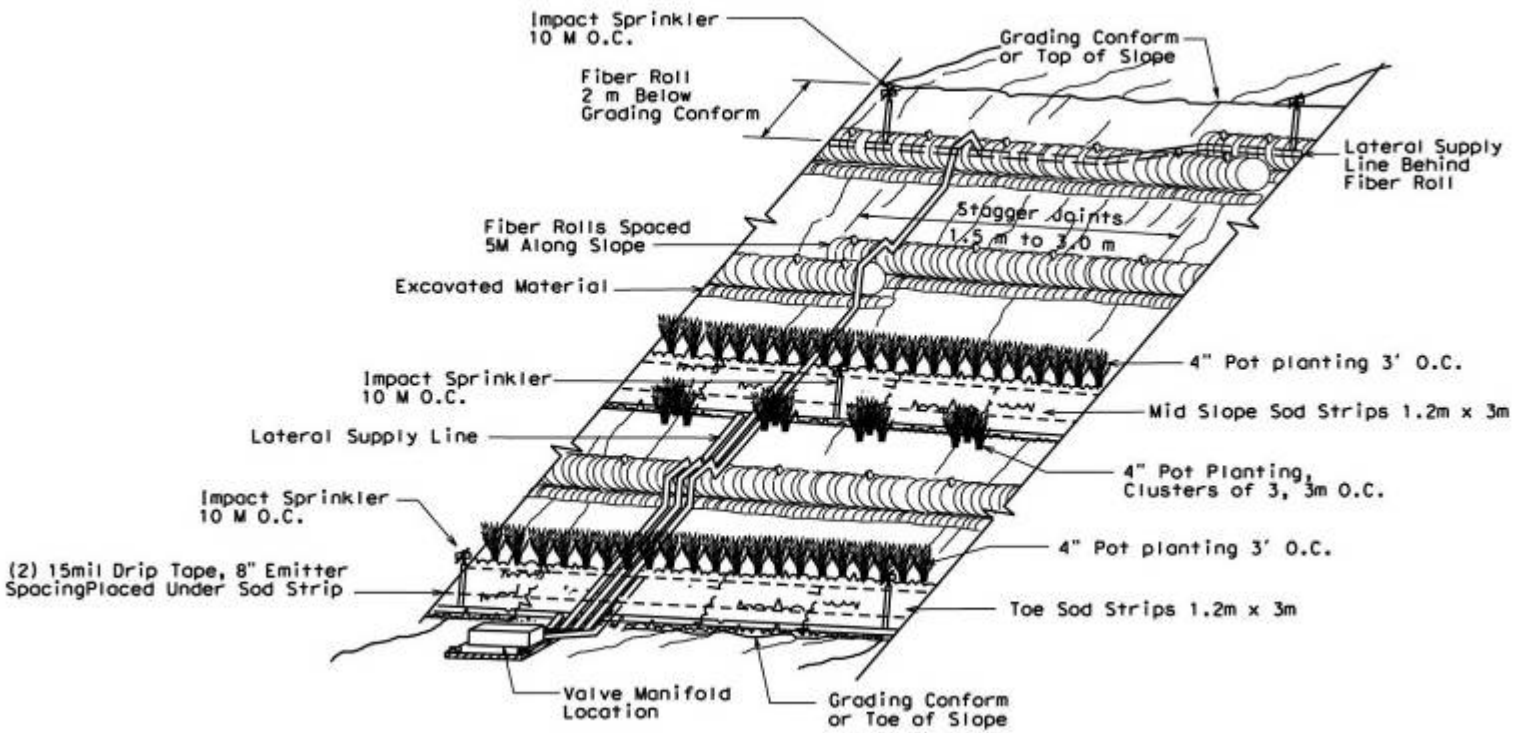
TEMPORARY IRRIGATION

- Irrigation promotes seed germination and allows grasses to establish to guard against erosion before the first rains.
- Irrigate once to twice a day, 45-60 days prior to the defined rainy season. Watering schedule shall be adjusted thereafter based on local conditions. Plants should be established after first growing season.
- Confirm system demand and water source. Use battery operated valves.

MOVE-IN/MOVE-OUT

- Promotes prompt application of erosion control materials when areas are deemed ready to receive erosion control.
- Assume three move-in/move-outs per location per year. *(4 locations x 3 move-in/outs x 3 year rainy seasons = 36)*

100 ft. CUT SLOPE STRATEGY



Erosion Control Detail

EROSION CONTROL COST ESTIMATE

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST	CONSTRUCTION COST
	Erosion Control				
202007	DUFF (COLLECTION & STOCKPILE)	3,990	M3	$50.00	$199,500.00
203001B	EROSION CONTROL (COMPOST BLEND BLANKET)	10,500	M3	$32.00	$336,000.00
203001C	EROSION CONTROL (MULCH BLANKET)	6,000	M3	$23.00	$138,000.00
203001	EROSION CONTROL (BLANKET)	2.4	HA	$90,000.00	$216,720.00
203001A	EROSION CONTROL (NETTING)	8.0	HA	$130,000.00	$1,045,590.00
203011	EROSION CONTROL (TYPE C)	10.5	HA	$15,000.00	$157,725.00
203012	EROSION CONTROL (DRILL SEED)	0.3	HA	$11,000.00	$3,300.00
203016	EROSION CONTROL (TYPE D)	20.7	HA	$12,500.00	$258,525.00
203016A	EROSION CONTROL (TYPE D) (DRAINAGE BASINS)	2.0	HA	$12,500.00	$24,500.00
203021	FIBER ROLLS	29,945	M	$12.00	$359,340.00
203026	MOVE-IN / MOVE-OUT (EROSION CONTROL)	36	EA	$1,200.00	$43,200.00
204042	EROSION CONTROL (SOD STRIPS)	4,595	M	$50.00	$229,750.00
	TEMPORARY IRRIGATION SYSTEM	1	LS	$150,000.00	$150,000.00
204099A	ESTABLISH EROSION CONTROL	1	LS	$80,000.00	$80,000.00
				SUBTOTAL	**$3,242,150.00**

LANDSCAPED AREAS

30 ft. Fill Slopes at Interchanges

- Implement slope roughening
- Apply 2 inch thick compost/duff blend blanket
- Install fiber rolls
- Apply 6 inch thick mulch (wood chips)
- Highway Planting and Irrigation Contract to follow

REFERENCES / SOURCES

- CAL POLY EARTH & SOIL SCIENCES
  - Roadside Erosion Control and Management Studies
  - Expert Assistance Task Contract (Prunedale Improvement Project)
  - Expert Assistance Task Contract (Highway 46 Widening – Union Segment)
- CALTRANS
  - “Highway Impact on Water Quality”
  - Stormwater BMP Manual
  - HQ Landscape Architecture Program
- CONTRACTORS
  - KCI Environmental
  - Superior Hydroseeding
  - Jet Mulch Company

REFERENCES / SOURCES

- PUBLICATIONS/REPORTS
  - *Landform Grading and Slope Evolution*, Journal of Geotechnical Engineering, Horst J. Schor and Donald H. Gray, October 1995.
  - *Stepped Slopes: An Effective Answer for Roadside Erosion*, The Landscape Architect and Specifier News, John Haynes, February 1990.
  - *Amendments Give Soil a Strong Constitution*, Erosion Control Magazine, September/October 2006.
  - *Golden Compost*, GreenScapes, US EPA Office of Solid Waste and Emergency Response, Texas DOT, July 2003.
  - *Performance of Erosion Control Treatments and Native Vegetation on Reapplied Topsoil*, for California Department of Transportation, Storm Water Program, by CSUS Office of Water Programs, February 2005.
  - *Compost Stabilizes Snow Covered Slopes for Olympic Competitors*, IECA News to Use, April 2007.

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  - *Caltrans Applies Compost Blankets for Roadside Erosion Control*, Caltrans News, February 2006.
  - *Santa Cruz County Compost Demonstration Project*, Santa Cruz Public Works Department, October 2006.
  - *Topsoil Preservation*, AASHTO, Center for Environmental Exellence, Copyright 2007.
  - *Section 1 Topsoil*, Section Editor: Laurel E. Vicklund
  - *Vegetated Erosion Control Mats for Site Stabilization*, Native Plants Journal, Martin van der Grinten and Linda L Gregory, Fall 2000.
  - *The Use of Mycorrhizal Fungi in Erosion Control Applications*, for California Department of Transportation by Indiana University Department of Biology and Earthworks Construction & Design, June 2004.

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